

WHAT IS CLAIMED IS:

1. A telephone line protection module providing overvoltage and failsafe protection, comprising:
- 5 a tip conductor, a ring conductor and a ground conductor;
- a spring member adapted for movement into contact with at least one of said
- 10 tip or ring conductors;
- a conductive member biased by said spring member toward said tip or ring conductor; and
- an overvoltage sensitive device positioned between said conductive member and one of said tip conductor or said ring conductor, such that the overvoltage
- 15 sensitive device is in electrical contact with said conductive member and one of said tip conductor or ring conductor.
2. The telephone line protection module of Claim 1, wherein said spring member is electrically connected to said ground conductor.
3. The telephone line protection module of Claim 1, wherein said spring member is connected to said ground conductor and urges said conductive member toward one said tip or ring conductor.
4. The telephone line protection module of Claim 2, wherein said spring member is soldered to a heat transfer member which urges said conductive member toward one said tip or ring conductor, and wherein said spring member is released from said heat transfer member after said solder melts to contact one said tip or ring
- 5 conductor to thereby short circuit said tip or ring conductor to ground.
5. The telephone line protection module of Claim 1, further including a third overvoltage sensitive device, and a heat transfer member soldered to said spring member, said third overvoltage sensitive device positioned between said heat transfer member and said conductive member.
6. The telephone line protection module of Claim 1, further including two said overvoltage sensitive devices, each said overvoltage sensitive device being sandwiched between said conductive member and a respective said tip or ring conductor.

7. The telephone line protection module of Claim 6, wherein said conductive member is mounted for movement toward said tip and ring conductors by said spring when said overvoltage sensitive device is damaged due to thermal energy.

8. The telephone line protection module of Claim 1, further including three said overvoltage sensitive devices, each bonded with an electrically conductive bonding material to said conductive member.

9. The telephone line protection module of Claim 1, wherein said overvoltage sensitive device is attached to one said tip or ring conductor.

10. The telephone line protection module of Claim 1, further including a heat transfer member soldered to said spring, and wherein said heat transfer member is in direct contact with said conductive member.

11. The telephone line protection module of Claim 1, wherein said overvoltage sensitive device is positioned directly between said conductive member and one said tip or ring conductor so that if a portion of said overvoltage sensitive device melts, said conductive member moves toward said one tip or ring conductor.

12. The telephone line protection module of Claim 1, wherein said tip and ring conductors define telephone line tip and ring conductors, and further including an equipment side tip and ring conductor, and further including a first and second overcurrent protection device, said first overcurrent protection device being connected between said telephone line tip conductor and said equipment side tip conductor, and said second overcurrent protection device being connected between said telephone line ring conductor and said equipment side ring conductor.

13. A telephone line protection module providing telephone line overvoltage and failsafe protection, comprising:

a base supporting at least a ground conductor, a tip conductor and a ring conductor;

5 a conductive spring member electrically connected to said ground conductor of said module, said spring member adapted for engaging said tip and ring conductors to short circuit said tip and ring conductors together and to ground;

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10 a heat transfer member bonded to said spring member with a heat sensitive material so as to become unbonded from said spring member in response to thermal energy transferred to the heat sensitive material via said heat transfer member;

a conductive member to which two or more overvoltage sensitive devices are mounted, said conductive member being biased toward said tip and ring conductors by said spring member via said heat transfer member; and

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15 said spring member being maintained in a first position such that said spring member is not in electrical contact with said tip and ring conductors when said heat transfer member remains bonded to said spring member, and said spring member is biased to move to a second position when thermal energy generated by said overvoltage sensitive devices causes said heat transfer member to become unbonded from said spring member, thereby allowing a portion of said spring member to move
20 and engage said tip and ring conductors.

14. The telephone line protection module of Claim 13, wherein three overvoltage sensitive devices are mounted to said conductive member to provide a balanced electrical circuit between said tip, ring and ground conductors.

15. The telephone line protection module of Claim 13, wherein said conductive member is assembled so as to include one said overvoltage sensitive device on one side thereof, and a pair of other said overvoltage sensitive devices on an opposite side of said conductive member.

16. The telephone line protection module of Claim 15, wherein each overvoltage sensitive device of said pair of overvoltage sensitive devices engages a conductive tower strip connected to a respective said tip and ring conductor, and said third overvoltage sensitive device engages said heat transfer member.

17. The telephone line protection module of Claim 13, further including a protective cover removably fastened to said base, and opposing inside surfaces of said protective cover restrict axial movement of said conductive member.

18. The telephone line protection module of Claim 13, wherein each overvoltage sensitive device is soldered only to said conductive member.

19. The telephone line protection module of Claim 13, wherein said conductive member and said overvoltage sensitive devices attached thereto define an assembly that is insertable between said spring member and said tip and ring conductors.

20. The telephone line protection module of Claim 13, further including three said overvoltage sensitive devices, and wherein two said overvoltage sensitive devices have substantially identical electrical characteristics, and a third said overvoltage sensitive device has different electrical characteristics than said two overvoltage sensitive devices.

21. The telephone line protection module of Claim 13, further including three said overvoltage sensitive devices, each electrically fixed to said conductive member.

22. The telephone line protection module of Claim 13, further including a first and second elongate conductor strip connected directly to respective module pins associated with customer equipment, and a third and fourth elongate conductor strip connected directly to respective module pins associated with a telephone line, and further including a first current limiting device sandwiched between said first and third conductor strips, and a second current limiting device sandwiched between the second and fourth conductor strips.

23. The telephone line protection module of Claim 13, further including a housing adapted for attaching to said base, and wherein said housing has formed on an inner surface thereof webs for maintaining registration of components mounted to said base.

24. The telephone line protection module of Claim 22, further including a half ringer circuit connected between said third and fourth conductor strips.

25. The telephone line protection module of Claim 13, further including first and second elongate conductor strips associated with customer equipment, and third and fourth elongate conductor strips associated with a telephone line, and further including a mechanism held in compression between said first and third conductor strips and between said second and fourth conductor strips, said mechanism being wired so as to provide a reversal of said telephone line.

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26. A telephone line protection module, comprising:

a plurality of pins, a first and second of which are associated with customer equipment circuits, and a third and fourth pin which are associated with telephone line circuits, and further including a fifth pin associated with ground;

5 a base for supporting said pins in a predefined configuration;

a first and second elongate conductor strip, each fixed to a respective first and second pin associated with the customer equipment;

a third and fourth elongate conductor strip, each fixed to a respective third and fourth pin associated with the telephone line circuits;

10 a conductive member to which three overvoltage sensitive semiconductor devices are mounted, a first and second said semiconductor devices being engageable respectively with said third and fourth elongate conductor strips;

a conductive spring member connected to said fifth pin, said conductive spring member having a pair of arms adapted for short circuiting together said third and

15 fourth elongate conductor strips when said conductive spring member moves toward a relaxed position; and

a heat conductive member soldered to said conductive spring member in a position such that said heat conductive member is spring biased against said third semiconductor device, whereby when said third semiconductor device generates

20 sufficient thermal energy to melt the solder, a portion of said conductive spring member arms move and cause short circuiting of said third and fourth elongate conductor strips.

27. The telephone line protection module of Claim 26, further including a housing having internal webs for providing registration stops for components attached to said base.

28. The telephone line protection module of Claim 26, wherein said third and fourth elongate conductor strips have at ends thereof a respective test point accessible via holes in a housing snap fit to said base.